igan, which, exhibiting but slight storm energy, moved on the 13th down the Saint Lawrence valley and beyond the limits of the chart.

VI.—At the midnight report of the 13th, a depression became apparent in Montana. On the 14th, showing but slight energy, it moved into southeastern Dakota, with local rains reported from the Missouri valley. On the 15th the low area changed its course to the northeast over Minnesota, and general rain was reported from the northwest. On the 16th the depression moved, while the barometer continued low in the lake region, over the Canadian provinces.

INTERNATIONAL METEOROLOGY.

International charts iv. and v. accompany the present number of this REVIEW. Chart iv. is published for May, 1880, and continues the series of that chart begun in January, 1877. Chart v. is prepared for August, 1880, and continues the series of that chart from November, 1877. In the description of these charts, much valuable information has been obtained from the "Monatliche Uebersicht der Witterung," published by Professor Dr. G. Neumayer, Director of the German Marine Observatory, and from the "Bulletin Mensuel," published by Mr. Marc. Dechrevens, of Zi-Ka-Wei, China.

Chart iv. exhibits the mean pressure, mean temperature and prevailing direction of the wind over the northern hemisphere for the month of May, 1880, as determined from one observation taken each day at 7.35 a. m., or 0.43 p. m. Greenwich mean time. Three areas of mean low barometer are exhibited on the chart, the first of which appears over British India, and is a constant feature of that part of Asia during the summer months. The isobar of 29.60 (751.8) encloses the central and eastern provinces of British India, where the mean pressure for the month was below 29.55 (750.6).

The second area of mean low pressure is also situated over Asia, and covers the whole of India, except the central provinces above referred to.

The third area of mean low barometer, 29.80, (756.9) extends over Greenland to northern Norway and Sweden, and thence over eastern and southern Russia. The isobarometric line of 29.80 (756.9) also covers Siberia eastward to the ninetieth meridian; it also covers the Chinese Empire south of the fiftieth parallel. An area of mean low pressure, 29.80, (756.9) also appears in North America over Minnesota and Manitoba.

Two areas of barometric maxima appear upon the chart; the first, 30.20, (767.1), occupies the Atlantic between the thirty-third and forty-fourth parallels of north latitude, and between 38° and 26° west longitude; the other, 30.10 (764.5), covers Texas and the Atlantic coast of the United States as far north as the fortieth parallel; it also extends eastward over the Atlantic, and includes the British Isles within its limits. The isobar of 30.00 (762.0) covers central and southern Europe, while that of 29.90 (759.4) extends over European Russia.

In North America, the high area of the Pacific covers the middle Pacific coast region, where the mean pressure ranges from 30.12 to 30.21 (765.0 to 767.3).

Compared with the preceding month (April), the pressure has increased over Greenland and northern Europe, the isobars of 29.60 (751.8) and 29.70 (754.6) being now replaced by those of 29.80 (756.9) and 29.90 (759.4). The pressure has remained nearly stationary in central Russia, but has decreased in the eastern part and in Siberia.

In Asia, the pressure has decreased generally in all parts of the continent, the most marked decrease appearing in China and Japan, where the mean pressure is about 0.10 inch below that of April.

In the United States, the mean pressure shows but slight changes. The high area of the south Atlantic extended farther northward during the month under consideration, and in Manitoba, the mean barometer was about 0.10 inch lower than in April. On the Pacific coast, the pressure was slightly above that of the preceding month.

Compared with the corresponding month of previous years, the mean pressure, in the United States, was above the normal on the Atlantic and Pacific coasts, and was slightly below the normal in the interior and northern parts of the country, the greatest deficiency occurring in Minnesota and Dakota.

In Canada, the pressure was slightly above the average, the greatest excess appearing in the maritime provinces.

The following table exhibits the mean pressure and mean temperature for the month of May, 1880, in the several countries of Europe and Asia, compared with the means as determined from observations taken during May in the years 1877, 1878, and 1879:

Countries.	Mean Barometer.			Mean Temperature.		
	May, 1877, 1878 and 1879.	May, 1880.	Departure.	May, 1877, 1878 and 1879.	May, 1880.	Departure.
Algeria	30.04	29.96	−0.08	72.9	71.9	− 1.0
Austria	29.86	29.88	+0.02	62.2	63.2	+ 1.0
British Isles	29.90	30.13	+0.23	54.3	55.1	0.8
Denmark	29.87	29.97	+0.10	52.2	53.6	+ 1.4
France	29.90	29.97	+0.07	60.9	64.7	+ 3.8
Germany	29.91	30.00	+0.09	58.6	59.3	+ 0.7
India	29.64*	29.62	−0.02	91.0*	89.7	− 1.3
Italy	29.93	29.84	−0.09	67.0	68.6	+ 1.6
Norway	29.81	29.91	+0.10	52.6	51.2	− 1.4
Portugal	30.03	29.91	−0.12	68.4	65.5	− 2.9
Russia	29.87	29.92	+0.05	61.3	62.3	+ 1.0
Spain	29.97	29.93	−0.04	68.7	66.5	− 2.2
Sweden	29.86	29.91	+0.05	48.4	50.6	+ 2.2
Turkey	29.94	29.92	−0.02	68.5	65.0	− 3.5

* May mean for two years only.

The accompanying table shows the deviations in temperature and pressure at isolated stations during the month of May, 1880, as compared with the mean of three years:

Comparative Thermometric and Barometric Means, with corresponding Departures.

STATION.	Mean Barometer.			Mean Temperature.		
	May, 1877–78–79.	May, 1880.	Departure.	May, 1877–78–79.	May, 1880.	Departure.
				°	°	°
Laghouat	30.00	29.96	−0.04	81.3	76.6	− 4.7
San Jose de Costa Rico				70.2	69.3	− 0.9
Gibraltar	30.03	29.99	−0.04	70.2	66.5	− 3.7
Malta	29.94	29.88	−0.06	68.6	70.7	+ 2.1
Sandwick Manse	29.85	30.00	+0.15	48.1	49.9	+ 1.8
Bridgetown	30.01	30.02	+0.01	82.9	81.5	− 1.4
Cape Town	30.08	30.06	−0.02	64.2	72.3	+ 8.1
Fort Napier	29.94	30.10	+0.16	72.1	71.8	− 0.3
Free Town	29.94	29.98	+0.04	86.2	85.1	− 1.1
Hobart Town	29.87	29.86	−0.01	55.7	51.8	− 3.9
Mauritius	30.06	30.09	+0.03	74.8	75.1	+ 0.3
Melbourne	30.03	30.01	−0.02	53.6	52.8	− 0.8
Nassau	30.00	30.08	+0.08	76.0	78.1	+ 2.1
Godthaab	29.91	29.76	−0.15	35.2	33.4	− 1.8
Stykkisholm	29.87	29.91	+0.04	41.0	45.1	+ 4.1
Thorshavn	29.86	29.89	+0.03	45.4	47.3	+ 1.9
Fort-de-France	29.86	30.19	+0.33	81.0	79.2	− 1.8
Zi-Ka-Wei	29.88	29.91	+0.03	63.4	63.7	+ 0.3
Athens	29.95	29.88	−0.07	74.3	73.8	− 0.5
Lahore	29.59*	29.50	−0.09	96.2*	103.8	+ 7.6
Cagliari	29.92	29.85	−0.07	69 6	68.7	− 0.9
Tokei	29.92	29.96	+0.04	61.7	61.3	− 0.4
Tromso	29.77	29.79	+0.02	44.7	40.0	− 4.7
Angra	30.11	30.24	+0.13	63.2	63.1	− 0.1
Funchal	30.12	30.06	−0.06	69.3	64.9	− 4.4
Ponta Delgado	30.14	30.16	+0.02	66.1	63.5	− 2.6
Lisbon	30.04	29.94	−0.10	66.3	65.3	− 1.0
Archangel	29.87	29.86	−0.01	48.4	44.8	− 3.6
Tiflis	29.87	29.88	+0.01	71.9	70.0	− 1.9
Astrakhan	29.90	29.91	+0.01	73.4	70.2	− 3.2
Ekaterinburg	29.89	29.76	−0.13	55.7	61.5	+ 5.8
Nukuss	29.84	29.79	−0.05	82.3	80.4	− 1.9
Tashkend	29.88	29.81	−0.07	78.7	77.5	− 1.2
Barnaul	29.91	29.87	−0.04	57.9	57.4	− 0.5
Yeniseisk	29.87	29.97	+0.10	47.4	50.7	+ 3.3
Pekin	29.81	29.78	−0.03	66.1	70.0	+ 3.9
Nikolaievsk on the Amoor				34.6	37.2	+ 2.6
Madrid	29.91*	29.93	+0.02	69.7	66.2	− 3.5
San Juan de Puerto Rico	29.99*	30.04	+0.05	81.0	78.8	− 2.2
Beirut	29.93	29.90	−0.03	77.2	73.0	− 4.2
Mexico	30.09	30.00	−0.09	57.8	57.2	− 0.6
Havana	30.00*	30.03	+0.03	78.7*	77.5	− 1.2
Navassa	29.95	29.98	+0.03	80.4	78.3	− 2.1
Paramaribo	30.01	30.13	+0.12	81.6	80.3	− 1.3
York Factory	30.02*	30.00	−0.02	28.1*	26.9	− 1.2

* May mean for two years only.

In North America, the temperature was above the normal over the entire country east of the ninety-fifth meridian, except

in Florida and the Canadian maritime provinces. On the north Pacific coast the temperature was below the normal, and in the other districts of the Pacific coast, it was slightly above.

The following are some of the extreme monthly mean temperatures reported at isolated stations:

LOWEST.	Degrees.	HIGHEST.	Degrees.
York Factory	29.6	Manilla	83.6
Godthaab	33.4	Freetown	85.1
Nikolaievsk on the Amoor	37.2	Bridgetown	81 5
		Paramaribo	80.3
		Fort de France	79.2

In British India the temperature was slightly below the mean; the highest monthly mean was reported from Lahore, 103°.8 (+39°.9 Cent.), and the lowest, 80°.8 (+27°.1 Cent.), at Goalpara.

The prevailing direction of the wind was, in the United States, southwesterly on the Atlantic coast, southerly in the interior, and southeasterly in Texas. In Dakota and Minnesota the winds were northwesterly, and on the Pacific coast they were generally southerly. In Canada they were southwesterly to westerly.

In Europe the prevailing directions were as follows: In central Europe, northerly and northeasterly; in Sweden and Norway, generally southerly.

In Hindostan the winds were generally westerly and northwesterly, except at Lucknow, Patna, and Hazaribagh, where they were easterly. In China they were southeasterly, and in Japan, southerly to southwesterly.

Over the north Atlantic, from N. 30° to N. 50° and west of the fortieth meridian, the winds were generally southwesterly; from N. 35° to N. 60° and east of 40° west longitude they were mostly northeasterly, except on the west coast of Ireland, where they were southwesterly.

The following brief notes, descriptive of the meteorological conditions over Europe during the month, are taken from the "Monatliche Ubersicht der Witterung."

During the first half of the month, the barometric depressions were numerous, and prevailed mostly over the southern part of central Europe, while in the northern sections high barometer prevailed. During the second half of the month the above conditions were reversed, barometric minima prevailing in the north and high barometer in the south.

The most marked feature of the month was the prevalence of barometric maxima over central Europe. The first area of high barometer, 30.55 (776.0), prevailed from the 3d to the 8th, and moved from Scotland over Germany toward southwestern Russia. The second area formed over the British Isles as the first reached Russia. From the 4th to the 10th this high area remained over the British Isles, and on the 14th it extended to northern Europe; about the 19th it reached north Germany, and on the 22d was over Spain, thence it moved slowly over the Mediterranean to Hungary, and disappeared in southwestern Russia on the 29th.

These areas of high barometer influenced the temperature in Europe to a marked degree, as is shown by the following: In Germany, from the 5th to 10th, the temperature fell below the normal; from the 10th to 15th it was above the normal; from the 15th to 19th there was a rapid fall, the minimum for the month being recorded on the latter date. From the 19th to 27th the temperature again rose rapidly, and reached the maximum on the last-mentioned date. During the night of the 18th–19th heavy and destructive frosts occurred, causing damage to crops and vegetables, and snow was reported from many points in the eastern and southeastern provinces. On the 27th the temperature rose above that usually recorded during the summer months of June, July and August, the maximum temperature reaching 90°.5 (32°.5 Cent.) at Munster, province of Westphalia.

Chart v. exhibits the paths of barometric depressions which have been traced from the daily international charts for the month of August, 1880.

The data are charted for each day of the month, on the charts accompanying the "International Bulletin" for that day, and, from these charts and additional reports, the movement of the centres of barometric minima are traced.

Twenty-four of the principal storms occurring in the northern hemisphere have thus been traced.

Concerning the general distribution of these depressions, the following is given:

Eleven appeared in the United States and Canada, four of which have been traced to the Atlantic coast and across the ocean. The marked meteorological feature of the month was the appearance of three violent cyclonic storms,—an unusual number for August. They developed south of latitude 20° and followed a northwesterly course towards the coast of the United States, causing immense damage to shipping, buildings, crops and other property. Additional interest attaches to the storm described as number iv., which swept over the island of Jamaica on the 18th and 19th, as such visitations are comparatively rare at Jamaica; the West Indian cyclones generally passing so far south of that island, that they scarcely affect it.

Nine depressions appear over Europe, one of which—low-area xvii—caused much damage to shipping and other property during its passage over England and the North sea.

Three areas of barometic minima are traced in Asia, together with the tracks of four typhoons which swept the China seas during the month under consideration.

The following brief descriptions are given of the storms first appearing within the limits of the Signal Service stations:

I.—This low-area was central in Minnesota on the morning of the 1st, and, crossing lake Huron during the day, it passed down the Saint Lawrence valley on the 2d, the centre being near Farther Point, barometer, 29.65 (753.1.) During the 2d and 3d, the storm passed over Labrador to the ocean and was central on the morning of the 3d in about N. 57°, W. 51°, the bark "Kryolith," in N. 57° 05′, W. 51° 55′, reporting, barometer 29.34 (745.2), drizzling rain, and on the same day, the s. s. "Gulnare" was driven within a few miles of Cape Farewell by a heavy southwesterly gale. On the 4th, the disturbance passed over southern Greenland and disappeared in the Arctic regions.

II.—This depression, evidently cyclonic, probably developed in the Carribean sea on the 5th or 6th, on which days brisk to strong easterly winds and rain were reported from Saint Thomas, and on the 7th and 8th, Navassa reported brisk easterly wind and threatening weather; but these stations were too far north of the centre of disturbance to show any decided barometric fall. The barometer at Kingston, Jamaica, fell slowly during the 6th, and on the 7th heavy rain fell, with gusts of wind from the east and east-southeast. During the 8th, 9th and 10th the disturbance passed near the coast of Yucatan into the gulf of Mexico, doing much damage to shipping, as is indicated by the following reports: The s. s. "E. B. Ward" lost rudder and sustained other damage off Cape San Antonio on the 9th. On the 10th, the brig "Aldino" was wrecked on Alacran reef (about N. 23°, W. 91°), and in N. 20° 06′, W. 91° 20′, the schooner "Seguin" encountered a revolving gale, in which she lost sails and sustained other damage. During the 10th and 11th the schooner "W. H. Keeney" had a hurricane from northeast to southeast. On the 11th and 12th, the cyclone pursued a northwesterly course toward the Texas coast; at 9.30 p. m. of the 12th the barometer at Brownsville read 29.69 (754.1), or 0.40 inch below the normal, and at 11.45 p. m. of the same day the barometer had fallen to 28.32 (719.3), being a fall of 1.38 inches (35 millimeters) in two hours and twelve minutes, and the wind had increased to hurricane force. During the 13th and 14th, the centre of disturbance moved slowly up the valley of the Rio Grande, and on the 15th, the course having become more northerly, the depression filled up in western Texas. This storm was accompanied by very heavy rains, 11.71 inches, or 297 millimetres,

in twenty-four hours being reported at Brownsville. Many buildings were blown down and much damage resulted to shipping; at Matamoras, the destruction was still greater, more than three hundred houses having been blown down, and many others almost entirely submerged, owing to the overflowing of the lagoons. At Fort Brown the barracks were unroofed and several buildings demolished, and many horses and mules were killed. At Point Isabel, eight vessels were wrecked and several lives lost.

III.—This depression appeared in New Mexico on the 15th, and moved in a northeasterly course toward the Missouri valley, where it was central, with decreasing pressure, on the 16th. Moving thence north-northeastward, the centre entered British America on the 17th, and passed beyond the stations of observation.

IV.—Is the West Indian cyclone which swept over the island of Jamaica on the 18th. It was first observed by the s. s. "Nith," near Guadaloupe on the 15th, when that vessel encountered strong and increasing northeast winds with heavy squalls; the lowest barometric readings for the month were also reported from Fort de France, on the 14th and 15th, with light rains, and at Saint Thomas, on the 15th and 16th, the wind was easterly, with violent gusts and light rain, but with no decided change in pressure. On the 16th, the s. s. "Nith," in N. 16° 04′, W. 65° 55′, had variable winds with very high sea, followed later by heavy squalls and torrents of rain, which continued until the morning of the 17th; at noon of that date, the vessel was in N. 16° 10′, W. 70° 26′; barometer reading 29.35 (745.5), wind veering from northeast to southeast and south, with heavy squalls and thunder and lightning. At San Domingo, vessels were driven ashore and wrecked by the heavy rolling seas, which preceded the hurricane, and continuous heavy rains prevailed from the 15th to the 19th. On the 18th, the s. s. "Nith" was in N. 16° 27′, W. 74° 57′; barometer 29.15 (740.4), with terrific squalls from the east and southeast and torrents of rain, the storm increasing in violence towards noon; at 4 p. m., the wind veered to the southward and the storm moderated, and at midnight the weather was comparatively fine. At Navassa, on the evening of the 18th, the barometer read 29.78 (756.4), with fresh northeast winds increasing to severe gale, and heavy rain; at 4 a. m. of the 19th, the wind changed to southeast, forty miles per hour, and at 3 p. m. the barometer had fallen to 28.94 (735.1), with wind still southeasterly, but greatly moderated. On the 18th and 19th, the storm reached Kingston, Jamaica, where it caused great destruction to life and property. Mr. Maxwell Hall reports that the barometer fell to 28.93 (734.8) at 9.15 p. m. of the 18th, and the wind, which had been light and variable, shifted to south at 10 p. m., and increased to sixty miles per hour, the highest velocity being recorded at 10.15 p. m., south, eighty miles, and at midnight it was west-southwest and had moderated to twenty miles per hour. The weather during the two preceding days had been warm and sultry, with heavy rains, and the sea at the port was greatly disturbed, the waves rolling in from the east. The cyclone passed from the southeastern to the western part of the island, prostrating plantations, houses, telegraph lines, and wrecking many vessels, and causing loss of life; in some places, shocks of earthquake were also felt. On reaching the western end of the island, the disturbance followed a northeasterly course toward Cuba, over which island it passed without causing much damage. On the 20th, the brig "Stockton," in N. 20° 32′, W. 73° 42′, encountered a strong southerly gale, in which she lost and split sails. The subsequent movement of this storm can not be traced, owing to lack of data, although reports from Signal Service stations in Florida indicated the existence of a barometric disturbance at some distance to the eastward, and on the 21st, the barometer at Bermuda fell to 29.85 (758.2).

V.—This depression first appeared in Minnesota on the 17th, and, moving slowly eastward, the centre of disturbance was over Lake Superior on the 18th; it then followed a northeasterly course, and disappeared beyond the stations of observation on the 19th.

VI.—This area was first central in Nebraska on the 19th; it moved eastward toward the lake region, and on the 20th, the area of low barometer covered the lower lake region, with no well-defined centre. On the following day the disturbance moved down the Saint Lawrence valley, the centre being near Montreal. During the 22d, the depression moved across the Gulf of Saint Lawrence, and was central near Saint Pierre, Newfoundland, and on the 23d, it disappeared south of Greenland.

VII.—This depression developed in the Saskatchewan valley on the 20th, and, moving eastward, was central near Moose Factory on the 21st, the barometer at that station reading 29.50 (749.3), a fall of 0.30 inch in twenty-four hours. During the 23d and 24th, the storm moved over Labrador toward the ocean, and on the 25th it disappeared in the Arctic regions, west of Greenland.

VIII.—This disturbance appeared on the Pacific coast on the 21st, and was central near Visalia on that day; during the 22d and 23d the area moved east-northeastward and disappeared south of Montana.

IX.—This storm appeared in Dakota on the 23d, and, moving eastward through Minnesota, was central in Michigan on the 24th. During that day and the following, the depression moved over Canada to the Gulf of Saint Lawrence, where it was central on the 25th. On the 26th it was probably central near N. 50°, W. 50°, and on the 27th the s. s. "Rhynland," in N. 50°, W. 40°, encountered strong west to northwest gales, with very low barometer. The storm continued its northeasterly movement, and on the 29th it disappeared in the Arctic regions to the northeast of Iceland.

X.—This area appeared in Nebraska on the 26th, and moved in a northeasterly direction toward Minnesota, where it was central on the morning of the 27th, the barometer at Saint Paul reading 29.68 (753.9), or 0.21 inch below the normal. On the 28th the centre of disturbance was in Wisconsin, and, moving thence northeastwardly, disappeared in British America.

XI.—This storm probably developed near N. 26°, W. 69°, on the 26th. The following vessel reports indicate the general features of the storm during the first part of its course. On the 26th the ship "Sunrise," in N. 26°, W. 69°, encountered a violent hurricane, in which she lost sails; on the same day the schooner "Lairg," in N. 25° 20′, W. 70° 20′, encountered a hurricane, commencing at northwest and backing to west and south-southwest, and on the 27th the wind moderated and shifted to east. The storm pursued a west-northwest course toward the Bahamas, and was encountered by the s. s. "Santiago," in N. 25° 50′, W. 74° 10′, that vessel reporting on the 27th, north-northwest hurricane with heavy northeast swell, barometer 29.80 (756.9); at midnight the wind shifted to southwest, with high sea, barometer reading 29.40 (746.7). On the 28th, the centre of disturbance was probably north of the Bahamas, the barometer at Nassau reading 29.76 (755.9), wind southwest. The s. s. "New Orleans" reported that the hurricane struck the vessel about 8 p. m. of the 28th, in N. 27°, W. 75°, when the sea rose in immense waves, and the wind blew from the northwest with terrific violence, backing to south and easterly; the hurricane lasted until 11 a. m. of the 29th. On the same day the s. s. "Morgan City," off the Florida coast, encountered a hurricane from west to southeast, lasting until the 29th. The storm reached the Florida peninsula on the 29th, the centre passing east and north of Key West; at Cedar Keys the wind reached a velocity of sixty-four miles per hour from the northeast. On the morning of the 30th, one vessel was dismasted and several buildings were blown down and otherwise damaged. The following vessel reports indicate the severity of the storm off the Florida coast. 30th, schooner "Hattie Haskell" encountered a hurricane in N. 30°, W. 76°, lasting thirteen hours; schooner "Annie Bell" was dismasted on the 29th, and on the same day the brig "Caroline Eddy," near Fernandina, had a strong northeast gale, in which the vessel was dismasted and

capsized. 30th, the bark "Felissa" was dismasted, thirty-four miles southeast of Cape Canaveral. The brig "John Roach" reported, gale commenced on the 28th, with wind from the north, and by the morning of the 29th it had increased to a hurricane, veering to northeast, east and southeast; the vessel was driven ashore sixteen miles south of Mosquito inlet (about N. 29°). The s. s. "City of Vera Cruz" foundered off the Florida coast, during this hurricane, with loss of all hands. The bark "Levanter," in N. 30° 30′, W. 78° 40′, had a heavy northeast gale veering to southeast, and lasting forty-eight hours. The captain of the schooner "Dora Ella" reported having passed nine wrecks between Jupiter inlet and Saint Augustine, and two between Point Derassa and Key West. On the 31st, the storm-centre moved slowly through Florida toward Alabama, where its influence was felt, the barometer at Mobile reading 29.47 (748.5) at the morning report of the 31st. This storm appears to have been sluggish in its progressive movement, but the persistency with which it remained over Florida and the coast indicated its dangerous nature. The effect of its presence was felt as far north as Wilmington and Cape Hatteras, North Carolina, the bark "Shooting Star," off Cape Lookout on the 29th, reporting high dangerous sea.

XI. (a)—This is a hurricane which probably developed south of N. 25° and east of W. 60°, and swept over Bermuda on the 29th and 30th. The reports of this storm are too indefinite to determine when and where it first appeared; the bark "Johnathan Chase," in N. 25° 18′, W. 61° 00′, reported a hurricane moving in a west-northwesterly direction on the 24th, and on the same day the ship "Queen of Scots," east of Bermuda, encountered a heavy northerly gale, backing to southeast by west and increasing to hurricane force, lasting until the 26th. The bark "Eliza White" reported a revolving gale, which commenced at southeast in N. 29°, W. 61°, during the 24th and 25th, and on the latter date the brig "M. A. Doran," in N. 25° 30′, W. 62°, reported a heavy north-northeasterly to northwesterly gale, barometer rapidly falling from 30.40 (772.1) to 29.50 (749.3). These reports, if taken in connection with the storm under consideration, would seem to indicate that the Bermuda hurricane remained almost stationary for several days near N. 25° and W. 60°. On the 29th, the brig "Lorne," in N. 32° 40′, W. 62° 40′, had a hurricane from the north-northeast, afterward shifting to northwest, and the s. s. "Coronet," in N. 33°, W. 55°, had a hurricane from southwest to northwest, in which she stove bulwarks and split sails. At Bermuda, the hurricane was most severe between midnight of the 29th and morning of the 30th, doing much injury to buildings, trees, and small vessels; the barometer reached its lowest point, 29.14 (740.1), about 1 a. m. of the 30th. On the 31st, the bark "Carmella," in N. 33°, W. 63°, had a severe hurricane from east-southeast to northwest, lasting, with great violence, for fourteen hours, during which the vessel lost sails and sustained other damage. The brig "Twilight," on the 31st, in N. 38°, W. 62°, had a northerly, veering to southeasterly, gale with heavy sea; on September 1st, the gale increased, with wind from the northeast, and on the 2d and 3d, in N, 35°, W. 60°, was a complrte hurricane from the northeast, vessel had decks swept, and sustained much damage; at midnight of the 3d, the storm abated, and on the 4th, the vessel was southwest of Bermuda, with fine weather and light southwesterly winds.

In connection with the storms occurring over Europe, the following is given supplemented by notes from the "Monatliche Uebersicht der Witterung," published by Prof. Dr. G. Neumayer, Director of the German Marine Observatory at Hamburg:

XII.—This depression first appeared near the English channel on the 1st, and was probably central near Plymouth, the barometer at that station reading 29.65 (753.1), at the morning observation of that day. The disturbance crossed the North sea and moved in a northeasterly direction over northwestern Europe, the centre being near the southern shore of the Baltic on the 2d. During that day and the 3d, the depression moved in a north-northeasterly course towards the Gulf of Bothnia, where it finally disappeared.

XIII.—This area appeared near Christiania on the 1st, barometer 29.28 (743.7); during the 2d and 3d, the disturbance passed in a north-northeasterly course through Sweden and disappeared over the Arctic ocean on the latter date.

XIV.—This low-area developed near Genoa on the 2d, and passed in a northeasterly course during the 3d and 4th, through Austria, where it developed considerable energy, being attended by stormy northwest winds and heavy rains; in the province of east Prussia, heavy floods occurred, causing much damage. On the 5th and 6th, the depression passed in a northerly direction across the Baltic and disappeared in Sweden.

XV.—This disturbance probably developed south of Iceland and moved northeastward, the barometer at Thorshavn on the 6th, reading 29.36 (745.7). During the 7th, 8th, and 9th, the storm skirted the Norwegian coast and finally disappeared over the Arctic ocean.

XVI.—This area first appeared in Spain on the 5th, with its centre near Bilbao; barometer 29.74 (755.3). Moving in a course slightly to the south of east, the depression crossed the Mediterranean and was central west of Sardinia on the 6th; its course then changed to northeast, and the storm crossed Italy toward Austria on the 7th and 8th. On the latter date, it was probably central near Hermannstadt, and disappeared on the 9th.

XVII.—This storm probably developed south of Ireland on the 6th, and was the most severe of the month. On the 7th, the centre of disturbance was near St. Ann's Head; barometer 29.28 (743.7), wind west-southwest; the storm passed across England, and on the 8th was central over the North sea; it then passed northeastward over Belgium and western Germany, causing much damage to shipping on the coasts of the North sea, and at many points on land. On the 9th, the disturbance moved toward the Baltic, where it disappeared. An area of relatively low pressure remained over Austria from the 10th to the 15th, causing very heavy rains in Austria and parts of Germany, the Danube reaching its highest summer level ever recorded during the present century.

XVIII.—This depression developed near the northwestern shore of the Black sea on the 16th, and moved northeastward through Russia during the 17th, 18th, and 19th; disappearing in central Russia on the last-mentioned date.

XIX.—This disturbance developed in the Arctic regions, north of Norway or Finnland, and moved in an east-southeasterly track across the White sea, and on the 22d, was probably central near Archangel; barometer, 29.67 (753.7). On the 23d, the disturbance disappeared in the valley of the Obi.

XX.—This developed over the Black sea on the 22d, and moved northeastwardly through central Russia on the 23d, 24th, and 25th, the centre of disturbance being near Kasan on the 24th, the barometer at that station reading 29.47 (748.4), and on the 26th, the disturbance disappeared in the valley of the Obi.

XXI.—This area developed on the 31st near Lugan, and passed northeastwardly over eastern Russia.

Of the storms appearing over eastern Asia, the following is given:

XXII.—This probably developed in China, north of Pekin, on the 10th, and moved eastwardly over Corea and the northern part of Niphon during the 11th and 12th, and disappeared over the ocean on the latter date.

XXIII.—This disturbance appeared in China on the 12th, and was central over the gulf of Pe-Chi-Li on the 13th. Moving northeastward on the 14th, it crossed the sea of Japan and disappeared north of Niphon on that date.

XXIV.—This depression appeared in Tartary, near Vladivostock, on the 16th, and disappeared to the northward on the following day.

The following description of the four typhoons that occurred during the month of August, 1880, are taken from the "Bulle-

tin Mensuel," published by Mr. Marc Dechrevens, of the Zi-Ka-Wei observatory:

Of the four typhoons that swept the China sea during the month, two prevailed below the twentieth parallel of latitude and moved from east to west; the remaining two moved from south to north, from the twentieth to the fiftieth parallels. These typhoons appear to originate in the region situated to the east of the Philippine islands, between N. 10° and 20° and E.140° and 150°, but owing to the small number of vessels frequenting that part of the ocean, it is impossible to definitely determine the region where they first develope.

The first typhoon of August (second of the season of 1880) entered the China sea by the channel which separates the islands of Formosa and Luzon, and was between the above-mentioned islands on the 28th of July. It pursued a westerly course, with a moderate and steady movement, and on tne 31st it passed south of Hong-Kong. On August 1st, it crossed the island of Hainan, the gulf of Tonquin on the 2d, and entered the continent on the 3d, in about N. 18°. At Manilla, strong westerly to southwesterly winds prevailed, and at Hong-Kong the winds were northeasterly during the 30th and 31st of July, after which they shifted to east and southeast. At Pakhoi, on the northern coast of the gulf of Tonquin, the winds were northeasterly and moderate during July 31st and August 1st, but on the 2d, they changed to strong easterly, and on the 3d, they were southeasterly, blowing with great violence. At Zi-Ka-Wei, the winds were easterly, with no decided change in barometric pressure. The progressive rate of this typhoon may be estimated at about seven miles (eleven kilometres) per hour.

The second typhoon of August presents the form of a parabolic curve, with its apex to the north of the Yellow sea, and between Cape Shan-tung and Corea. Its progressive velocity, during the first part of its course, and until reaching the twenty-sixth parallel was very slow, being about 6 miles (10 kilometres) per hour, but its rate subsequently increased to about 19 miles (30 kilometres) per hour, between the fortieth and forty-fifth parallels of latitude. The following report of the bark "Laura R. Burnham" indicates the severity of the typhoon: At midnight of the 5th, the vessel was west of the centre, barometer 29.10 (739.0), wind north to northwest and blowing with terrific violence; the vessel lost sails, rudder, and sustained other damage and put into Nagasaki in distress, on the 11th. The ship "Mary Whitridge," which left Shanghai for Nagasaki on July 28th, was probably very near the centre, having reported on the 4th, barometer 28.50 (723.9). This typhoon was accompanied by heavy rains throughout its passage, and these were the only rains of the month at Cape Shan-tung and Newchwang.

The third typhoon (24th to 28th) traversed the entire archipelago of Japan. This disturbance moved more rapidly than the two just described, having in four days, moved from N. 25°, E.125°, to N. 50°, E. 145°, with a steady velocity of about 19 miles (30 kilometres) per hour. This typhoon was very severe throughout Japan, the wind at Tokei reaching a velocity of 38 miles south, on the 25th, and the barometer at that station read 29.41 (747.0) on the same day. The U. S. steamer "Swatara," reported: At noon of the 25th, in N. 37° 19′, E. 141° 30′, barometer 29.79 (756.7) and falling; moderate south by west wind, of force 3. The barometer continued to fall and the wind increased in force until 6 p. m., when it shifted to south; at 9 p. m. the barometer read 29.66 (753.4), wind south by east, increasing to force 7; 10 p. m., barometer 29.62 (752.3), wind south-southeast, force 7 to 8; 11 p. m., barometer 29.58 (751.3), wind southeast by south, moderate gale, force 7 to 8, light rain. At midnight, the barometer read 29.54 (750.3), the wind blowing in heavy squalls from the southeast, force 7 to 9. The wind then backed to southwest, blowing a strong gale (9 to 10), and the barometer continued to fall until 4 a. m. of the 26th, when the lowest barometric reading was 29.44 (747.8). By noon of the 26th, the barometer began to rise and the wind decreased in force.

The fourth typhoon of August (fifth of the season of 1880), followed nearly the same course as that of July 31st, 1879, and is reported to have been, at Pakhoi, the most severe storm that had visited that place during a period of twenty-five years. The sugar-cane crop was greatly damaged and many junks were wrecked. The typhoon moved westward with a steady velocity of 7 miles (11 kilometres) per hour, and passed to the north of Hainan on the 31st. The lowest barometer reported by H. B. M's ship "Magpie," at Pochin Roads, China sea, during the passage of this disturbance, was 28.71 (729.3) on the morning of the 31st, the wind having moderated from northeast, force 12, to north, force 3.

OCEAN ICE.

June 21st to 24th: ship "E. J. Spicer," in N. 48° 50′ to 45° 50′, and W. 48° to 52°, passed a great number of icebergs, some of which were one hundred feet high.

28th: s. s. "Hermod," in N. 43° 50′, W. 50°, observed two very high icebergs.

July 1st: bark "Walborg," in N. 44° 06′, W. 48° 18′, saw three icebergs.

4th and 5th: bark "Marie," in N. 44° 20′, W. 46° 56′, passed seven large icebergs, some of them fully five hundred feet high.

7th: s. s. "Matthew Bedlington," in N. 40°, W. 40° to 49°, passed through twenty large icebergs, with several smaller ones floating amongst them and very dangerous to navigation.

10th: bark "Elida," in N. 47° 48′, W. 50° 45′, passed seven icebergs, some of them very large, being about five hundred feet high.

13th: s. s. "Lord Gough," in N. 43° 31′, W. 51° 32′, passed three large icebergs.

15th: s. s. "Sophie," at New York reports: was surrounded by icebergs for eight days in N. 43° to 42°, and W. 49° 30′, to 50° 30′. Some were one hundred feet high, melting and falling into the sea with a crashing sound. Saw no ice after reaching N. 41°

16th: s. s. "Devon," off eastern edge of Banks, sighted large icebergs.

17th: bark "Johanne," in N. 46° 03′, W. 48° 33′, passed an iceberg.

19th: s. s. "Main," in N. 47° 45′, W. 52° 12′, passed an iceberg. In N. 46° 56′, W. 52° 24′, up to Sable, passed for a distance of 30 miles, numerous large icebergs, and in N. 46° 11′, W. 53° 34′, passed two large icebergs; s. s. "State of Nebraska," at New York reports under date, that she passed from N. 44° 32′, W. 42° 13′, to N. 44° 22′, W. 48° 04′, two large icebergs.

20th: bark "Johanne," in N. 45° 15′, W. 48° 53′, passed an iceberg.

23d: s. s. "Jason," in N. 45° 18′, W. 47° 40′, passed a large iceberg; bark "Johanne," in N. 43° 42′, W. 51° 44′, passed an iceberg.

TEMPERATURE OF THE AIR.

The distribution of mean temperature over the United States and Canada for the month of July, 1882, is exhibited by the dotted isothermal lines on chart ii. The table of mean temperatures at the lower left-hand corner on the chart shows the average temperature which prevailed in each district during the current month, compared with the mean temperature of each district, as determined from observations taken at Signal Service stations during the corresponding month of the past ten years.

During the month of July, the mean temperature has been below the normal in all districts except New England, the northern plateau, and in the middle and south Pacific coast regions, where the following slight dapartures occurred: +0°.4, +1°.1, +1°.0 and +0°.4, respectively. In the upper Mississippi valley, where the greatest departure occurred, the temperature has been 6° below the normal; and in the Ohio valley, Missouri valley, extreme northwest, upper lake region and east Gulf states, the departures have been 5°.1, 4°.9, 4°.6, 4°.2 and